

UNICORE

und das Projekt UNICORE Plus

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Forschungszentrum Jülich
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ZKI Arbeitskreis Supercomputing

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The UNICORE Projects

UNICORE is funded in part by BMBF, the German Ministry of Education and Research under Grants:

Project **UNICORE**:

01-IR-703 (August 1, 1997- December 31, 1999)

Project **UNICORE Plus**:

01-IR-001 (January 1, 2000 - December 31, 2002)

The UNICORE Projects
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UNICORE future development

Project partners

- Forschungszentrum Jülich (FZJ, project leader)
- Rechenzentrum Universität Stuttgart (RUS)
- Deutscher Wetterdienst Offenbach (DWD)
- Konrad-Zuse-Zentrum Berlin (ZIB)
- Leibniz-Rechenzentrum München (LRZ)
- Rechenzentrum Universität Karlsruhe (RUKA)
- Paderborn Center for Parallel Computing (PC²)
- Technische Universität Dresden (TUD)
- Pallas GmbH Brühl (Pallas)
- fecit*
 - * Subcontractor to Pallas

Vendor Support

- Hitachi
- HP
- IBM
- NEC
- Siemens/Fujitsu
- SGI/Cray
- Sun

Partners in UNICORE Forum along with ECMWF, debis

The UNICORE Projects

Project Partners

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UNICORE Sites (2000)

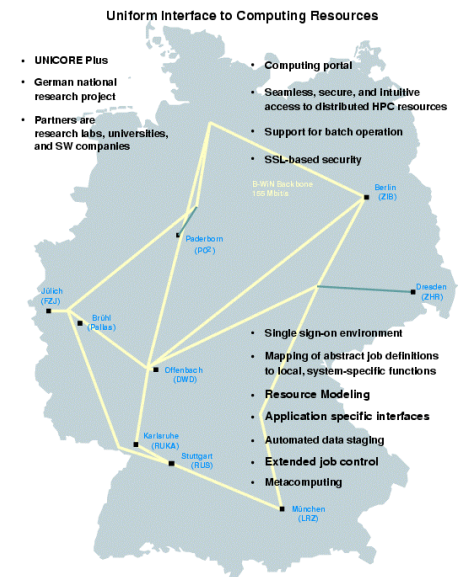
In Progress:

LRZ: SR 8000

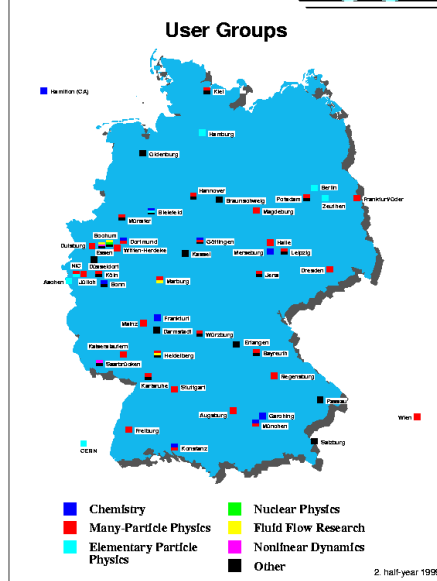
RUS: SX-5

Mid 2000:

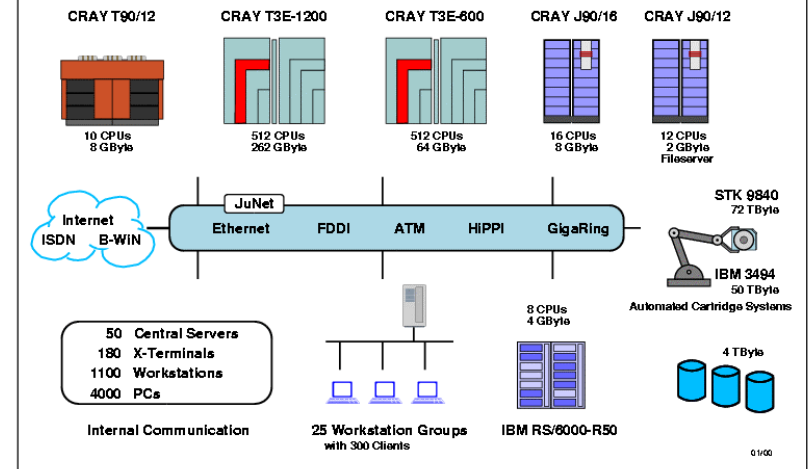
Gigabit Networks



Research groups using
Jülich's
John von Neumann
Institute for
Computing (NIC)

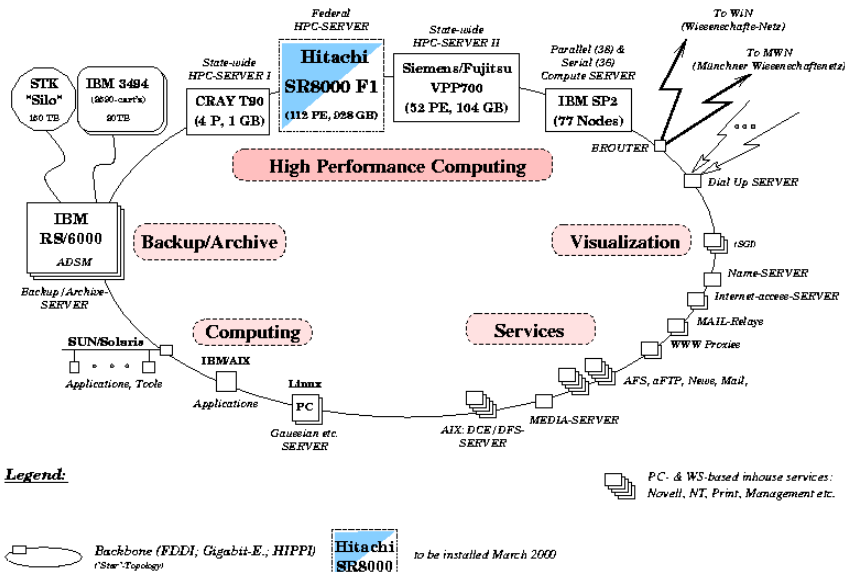


Central Computer Systems and Communication Networks

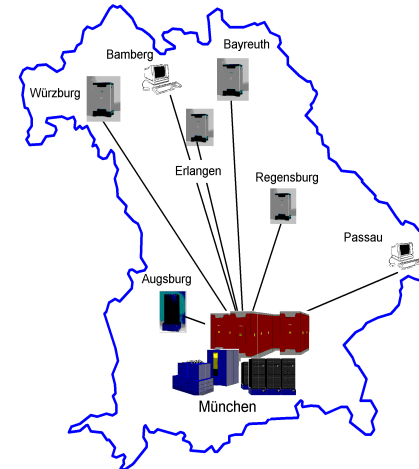


LRZ Central Computing Configuration

- November 1999 -



Bavarian Co-operative Computing Alliance



- Regional HPC Computers:
 - Uni Augsburg IBM RS/6000 SP/14
 - Uni Bayreuth: Fujitsu VPP300/2
 - Uni Erlangen Fujitsu VPP300/6
 - Uni Regensburg Fujitsu VPP300/2
 - Uni Würzburg Fujitsu VPP300/2

LRZ München (State Supercomputing Centre for Bavaria)

UNICORE Motivation

- UNICORE develops a

seamless
secure
intuitive

software infrastructure to HPC resources

- UNICORE creates an HPC GRID

UNICORE Goals

- Consistent batch access to different remote systems
- Overcome the seams created by
 - different hardware architectures
 - incompatible system software
 - historically grown computer center practices

UNICORE Goals

- Support multi-system and multi-site applications for one job
 - use of the optimal system for the given problem
 - best utilization of expensive resources
 - use of special hardware
 - use of remote data

UNICORE Goals

- Exploit existing and emerging technologies
 - communication via Internet
 - Web techniques, Java
 - X.509 certificates

UNICORE Goals

- Minimal intrusion into the centers
 - interface with existing batch systems
 - no changes to established user names and Unix uid/gids
 - support local security measures (firewalls, DCE,)

The UNICORE Projects

Project Partners

Motivation and Goals

UNICORE Functions

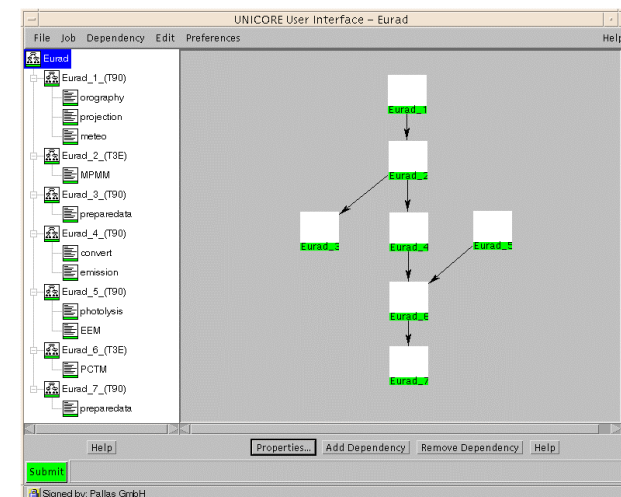
The Architecture

Implementation and Status

UNICORE Future development

UNICORE Functions

- Interactive creation of batch jobs (GUI)
- System independent definition of jobs (AJO)
- Submission to different platforms at different locations without changing the job definition
- Interdependent multi-site jobs



UNICORE Functions

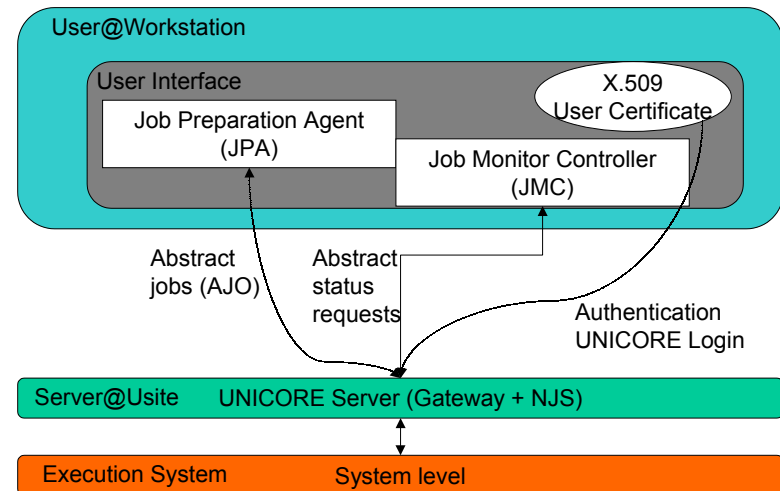
- Automatic control of job flow
- Automatic staging of data
- Full job control by the user through a GUI
- Secure access to remote data
- Reuse of existing jobs (restrictions to portability)

UNICORE Functions

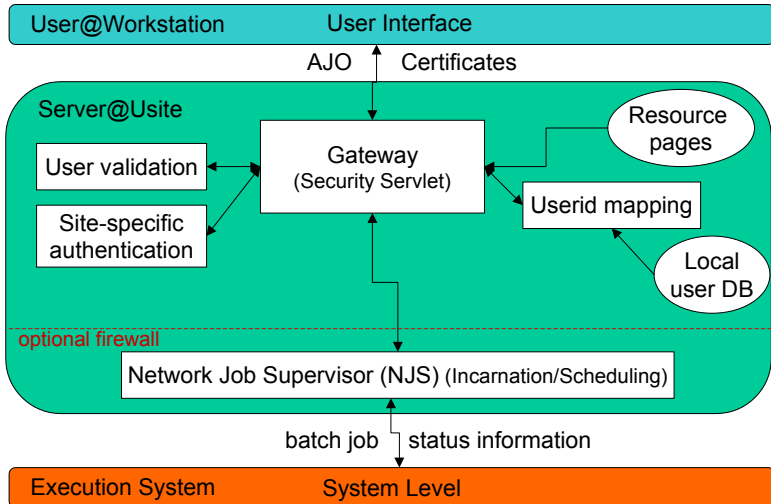
- Authenticate user once through UNICORE certificate (X.509)
- Map to existing user identification at target site
- Authorize at target site
- Respect site policies

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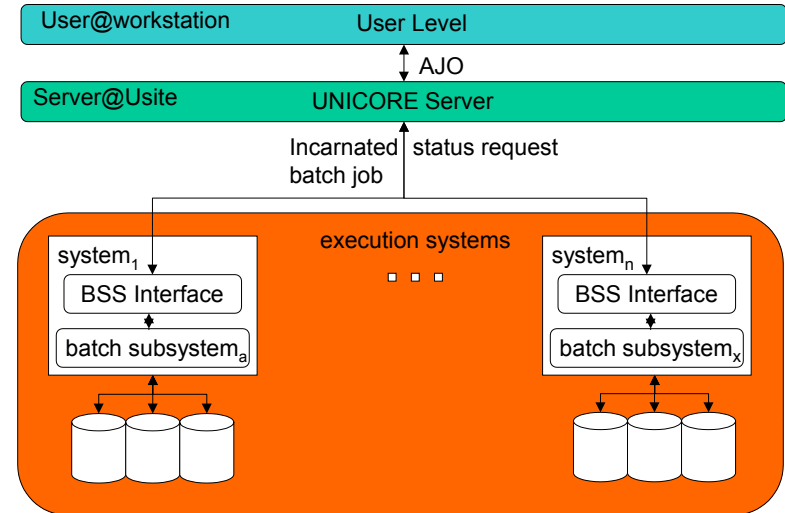
User Level



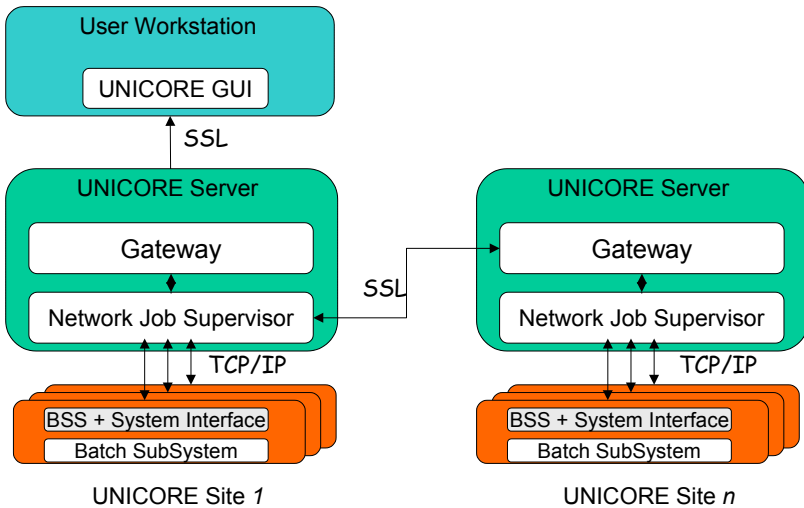
UNICORE Server



System Level



UNICORE Architecture



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UNICORE Implementation

- A first prototype has been completed and demonstrated (September 1999)
- Proof of concept
- Implementation of all essential functions
- Tested on Cray, Fujitsu, NEC, IBM

UNICORE Implementation

- Abstractions of Jobs through AJO (Abstract Job Object)
 - Specification of actions and attributes of jobs through a Java Class Library
 - Central UNICORE protocol
- Public Key Infrastructure (PKI) at LRZ Munich
 - X.509 User Certificates
 - Server certificates
 - Applet signer/software developer certificates

UNICORE Implementation Status of first prototype

- Graphical User Interface (JPA/JMC) implemented as signed Java Applet
 - zero administration solution
 - Browser dependency (Netscape/IE)
- UNICORE Gateway implemented as Java Servlet
- site specific authentication demonstrated for
 - Smart Cards
 - DCE

UNICORE Implementation

- Network Job Supervisor (NJS) implemented as Codine Extensions (BSS by Genias/Gridware)
 - UNICORE job structure (dependencies) translated into Codine
 - Job incarnation to CRAY, Fujitsu, NEC, IBM
- File Transfer implemented through *scp* (temporary solution)

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UNICORE development

- Continuation of UNICORE development till December 2002 as part of the UNICORE Plus project
- New functions
- Technical enhancements
- Deployment of UNICORE at the participating sites
- Use of UNICORE in other projects

UNICORE development

Resource Modeling

- Extensions to UNICORE's resource model
- Resource specifications
- Resource selection
- Resource mapping

Lead partner: ZIB, Berlin

UNICORE development

Data Management Enhancements

- Fast and secure file transfer
- Access to special data archives (e.g. HPSS)
- Remote file browser capabilities

Lead partner: RUS, Stuttgart

UNICORE development

Extended Job Control

- Automated computational experiments
- Job chains
- Conditional execution

Lead partner: DWD, Offenbach

UNICORE development

Application Specific Interfaces

- Creation of Application Portals
- Custom build interfaces for new applications
- Integration of existing GUIs
- Generalized tool kit

Lead partner: FZJ, Jülich

UNICORE development

Metacomputing

- Simultaneous use of multiple systems
- Advanced reservation techniques
- Co-scheduling
- Quality of Service

Lead partner: PC², Paderborn

UNICORE development

Metacomputing

- MPI Integration into UNICORE
 - PACX Extension
- Lead partner: RUS
- UNICORE Application Performance
 - Vampir extensions

Lead partner: TUD, Dresden

UNICORE development

UNICORE Administration

- Installation and administration tools
- Reference Installation
- PKI enhancements
- Quality assurance

Lead partner: FZJ, Jülich

UNICORE development

UNICORE Development

- Main stream code development
- Packaging
- Support

Lead partner: Pallas, Brühl

UNICORE development

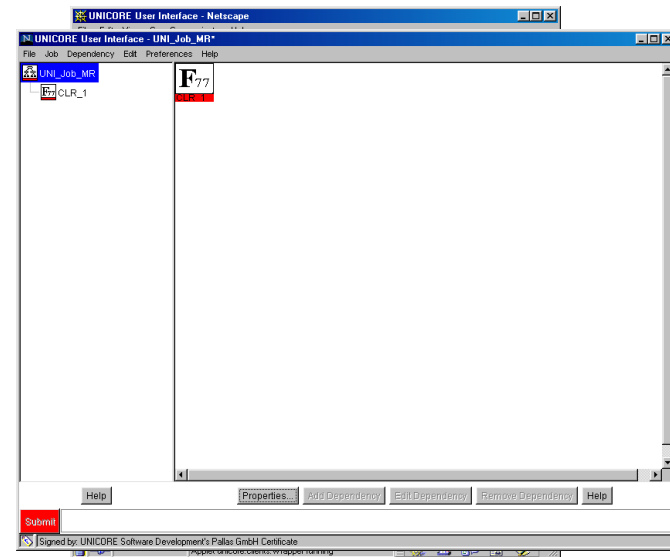
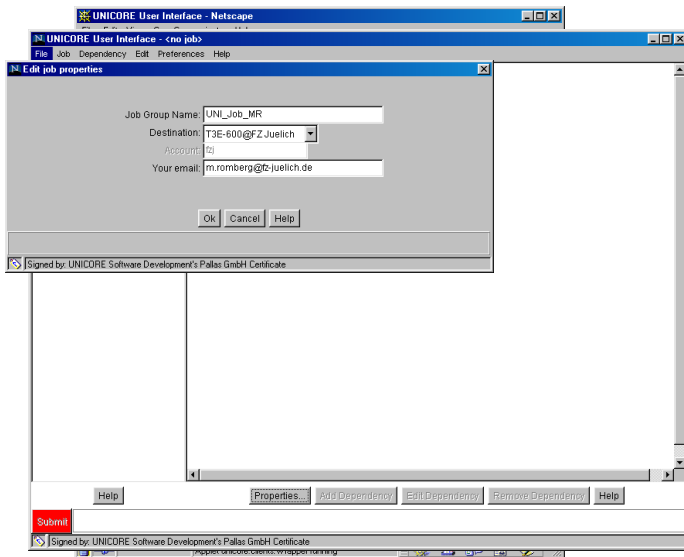
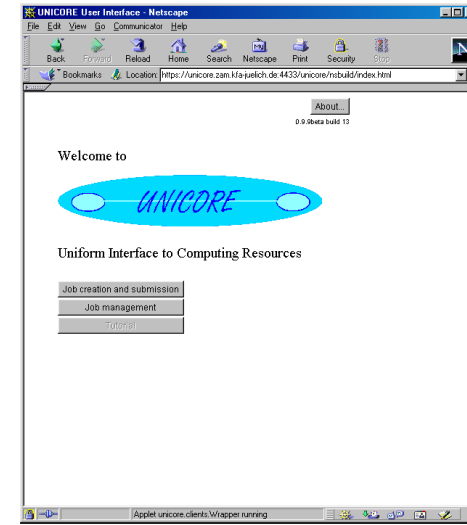
UNICORE Implementation Enhancements

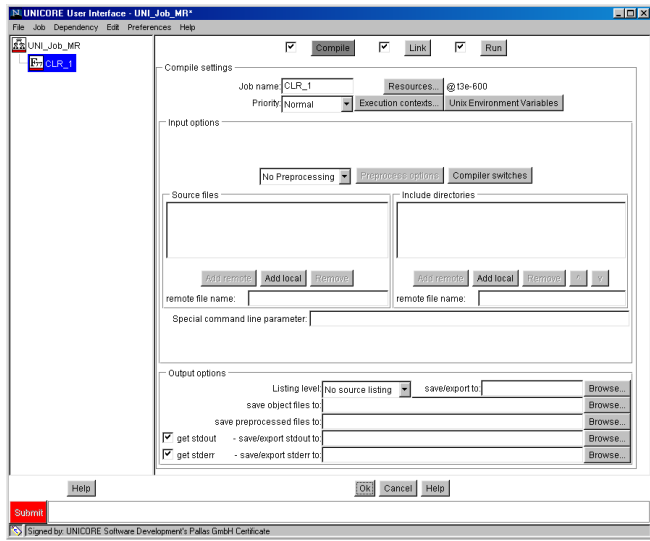
- Replace Java Applet by Java Application
 - Browser independence
- Replace Codine by custom NJS
- Move UNICORE BSS Interface to target system
- Replace Jigsaw https Server by UNICORE gateway

UNICORE Milestones

	Unicore Version
30.06.2000	V 3.0 Base functions
30.06.2001	V 3.5 Extended functions
30.06.2002	V 4.0 Final version

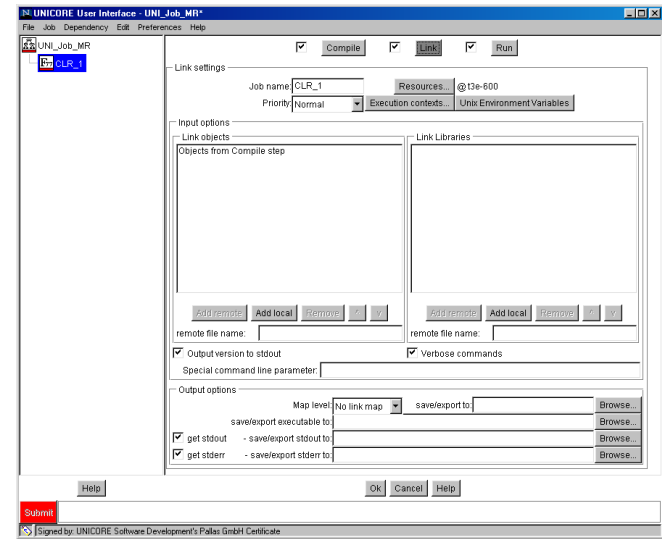
UNICORE Demo





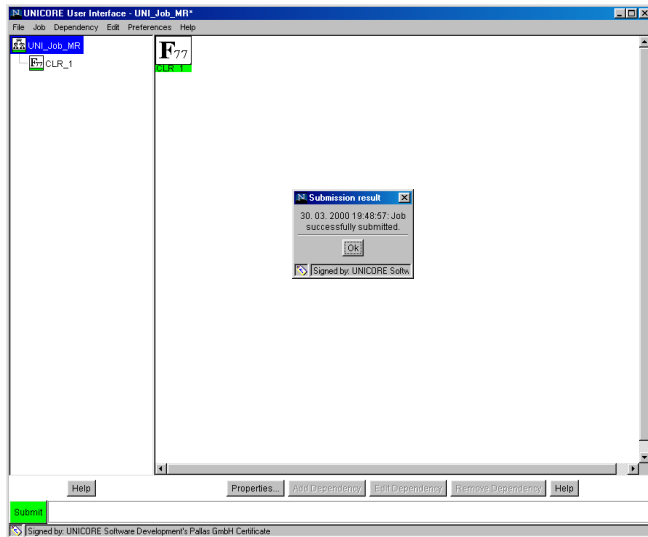
May 2000

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May 2000

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May 2000

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May 2000

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